NAC INTERNATIONAL

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Mr. William Knoll
United States Department of the Navy
Code NAVSEA 08U NC2
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Subject: Comments by NAC International on the Draft EIS for a Container System for the Management of Naval Spent Nuclear Fuel

Dear Mr. Knoll:

NAC International (NAC) is pleased to submit the attached comments on the U.S. Department of the Navy's draft Environmental Impact Statement (EIS) for a Container System for the Management of Naval Spent Fuel. NAC, founded in 1968, is the leading U.S. nuclear spent fuel technology, transportation services and fuel cycle information company.

A NAC's nuclear fuel storage and transportation cask experience and understanding of spent fuel cask design bases -- and our appreciation for regulatory and public policy realities -- all support the choice of the transportable storage cask as the "preferred alternative" for the final EIS.

As stated in the EIS, dual-purpose systems offer obvious advantages to the Navy as compared to single-purpose systems. Cost, efficiency and environmental benefits would be realized through utilization of systems that enable spent fuel to be both transported and stored dry in the same container. Four of the six alternatives evaluated in the EIS provide this dual-purpose capability. We support your conclusion, subject to the attached comments, that the costs and environmental impacts associated with implementing any of these alternatives are approximately equal.

The alternatives, however, have marked differences in their engineering and
B regulatory maturity. These differences create a defacto environmental risk not evaluated in the EIS -- namely, the Navy's potential inability to implement a selected alternative within the required time frame due to unresolved engineering and regulatory issues. Of the four dual-purpose system options, only the transportable storage cask, the NAC-STC, possesses the required regulatory approvals allowing for its immediate deployment. Upon certification of an internals package customized to meet the Navy's demands, the NAC-STC could be put into immediate use to store spent fuel in Idaho or transport spent fuel to an interim storage facility. The uncertain lead time necessary for the design and certification of other systems could conflict with the implementation schedule in the Idaho Settlement Agreement, thereby making these unlicensed systems far less viable choices as a "preferred alternative" in the foreseeable future.

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Further distinguishing NAC's transportable storage cask is its inherent capability to accommodate a multi-purpose canister. While other alternatives examined in the EIS focus only on the canister design, the NAC-STC provides an engineered system that is highly flexible --- one capable of uncanistered storage or transport, or accommodating a dual/multi-purpose canister (NAC-MPC). It is a level of versatility not found in other alternatives and one that ideally fulfills the rigorous schedules and practices mandated by the Idaho Settlement Agreement. The NAC-STC system can be placed in immediate service today, yet can accept an MPC when Federally driven disposal criteria are put forth.

For the record, the NAC-MPC technology, which uses the NAC-STC as an overpack, was recently selected by Yankee Atomic Electric Company to meet its transportable storage needs at the Yankee Rowe plant in Rowe, Mass. This system is the nation's first generation MPC and exceeds Department of Energy criteria. An additional dimension of the NAC-MPC is that its transport overpack, fuel basket and overall design methodology closely parallel those of the private sector Universal MPC System™ (UMS™), which is under development by an NAC-led team to accommodate virtually all of the nation's commercial spent fuel.

NAC views these differentiating characteristics as profound enough to justify the selection of the NAC-STC transportable storage cask as the "preferred alternative" in the Navy's final EIS. We believe it is a conclusion fully justified by objective evaluation of the designs and by the engineering and regulatory maturity of the concepts.

We appreciate the opportunity to provide our comments on the EIS and look forward to helping the Navy achieve its important spent fuel management objectives.

Sincerely,

Edward M. Davis
President and CEO

Attachment

cc: Mr. Richard A. Guida, NAVSEA
Ms. Jill Lytle, DOE-HQ
Adm. Bruce Demars, DOE-HQ

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Comments on the Draft Environmental Impact Statement
for a Container System for the
Management of Naval Spent Nuclear Fuel

General Comments

1) The Introduction to the EIS (S.1) states that factors to be taken into consideration in developing a preferred alternative include public comments, protection of human health and the environment, cost, technical feasibility, operational efficiency, regulatory impacts, and storage or disposal criteria. Schedule realism is an equally important factor for evaluation, one that is tied to environmental impacts. The Idaho Agreement encourages near-term movement of fuel from basin storage to dry storage. It also states that Navy fuel is to be among the first to be transported to an interim storage or permanent disposal site. These principles were derived from public safety and environmental concerns. Since not all concepts evaluated in the EIS are equally far developed, they represent differing risk in terms of meeting the
C Agreement's schedule objectives. An environmental evaluation of the alternative concepts is incomplete without an assessment of comparative ability to meet schedule-driven environmental criteria. It is our judgment that such an evaluation would demonstrate the superiority of more mature technologies that are capable of both storage and shipment in the same vehicle. The NAC-STC dual-purpose cask is such a vehicle—one that is amenable to canistered or uncanistered application.

2) The EIS and its transmittal letter conclude that the environmental impacts of any of the alternative concepts are very small—a conclusion with which we are in general agreement. However, the purpose of the EIS, as described in Section 1.0, **Proposed Action,** was not to evaluate the environmental acceptability of dry storage but rather to assess the environmental impacts associated with the several types of container systems capable of performing that function. It is, therefore, imperative that the assumptions used in the EIS not introduce biases that would have a significant effect on the comparative performance of one system versus another. There are several instances in the EIS where the assumptions fail to meet this standard, resulting in comparative performance differences of an order of magnitude or more. For the reader who is interested in comparative risks, however small, the assumptions will distort the conclusions. The specific comments below address these points in detail, but it is the assumptions relative to shipment external dose rate (Section B.5.1), probability of missile or aircraft impact (Section A.2.5), and normal/off-normal handling risk (Sections A.2.4 and A.2.5) that we conclude introduce biases in the evaluation.

Specific Comments

i) Figures D.5 through D.9 (Section D.2.1) show in cartoon form the operational steps required for each concept. The number of handling iterations varies greatly for the alternative concepts. Every nuclear facility probabilistic risk assessment that we have studied concludes that such handling operations are a dominant factor in cumulative risk. However, the EIS assumes that only the movement of fuel into and out of the cask or container contributes to risk, in effect ignoring the effects of other handling operations. Since the concepts involve varying numbers of handling operations other than the initial loading in Idaho or transfer at a repository, this significant differentiating factor ends up neglected in the EIS. D

ii) The hypothetical accident risks during dry storage focus on projectile-based accidents, either aircraft or wind-driven projectile. Our reading of the EIS suggests that a fixed event probability is assumed (independent of the number of casks or size of the footprint), while damage is assumed to be a function of the quantity of fuel in the cask. These assumptions combine to produce a higher risk for a larger-capacity cask. In reality, the probability of occurrence is a function of the footprint of the storage site. Smaller cask usage will require more casks and produce a larger footprint (consequently a higher probability of occurrence) but a smaller probable release. Larger cask usage will produce a smaller footprint (consequently a lower probability of occurrence) but a higher probable release. While we have not performed the analysis, it is our judgment that the combined probabilities will nearly equal each other. E

iii) The estimated container capacity is an important factor since it influences concept cost, schedule and risk. The transportable storage cask (NAC-STC), having the largest bore of any concept under evaluation, is shown to have the highest capacity for submarine fuel (Section B.1, Table B.1). However, the EIS shows it to have only half the capacity for surface ship fuel. In the absence of dimensional information, we cannot make any conclusive statements relative to the estimated capacity. Based on the large bore of the NAC-STC and our knowledge of alternative systems, however, the degradation of capacity for the NAC-STC would appear to be in error. F

iv) The shipment external dose rate affects the risk to transportation personnel and to the general public. The EIS (Section B.5.1) uses measured values for the M-140 but uses regulatory limits for the other concepts. This assumption results in an order of magnitude difference in risk. In reality, we find it common that the as-fabricated cask will result in dose rates one or more orders of magnitude lower than design. This is because conservative design codes and limiting case loadings are used in the design process. Use of a regulatory limit for casks other than the M-140 creates an artificial bias that dominates the overall risk evaluation of the alternative concepts. To rectify this discrepancy, a regulatory limit should be used for all concepts or, alternatively, a code evaluation of the performance of each design relative to an assumed source term should be performed. G

Commenter: Edward M. Davis - NAC International, Georgia

Response to Comment:

A. In Chapter 3, Section 3.8, Comparison of Alternatives, the EIS states that the impacts for most categories are small or nonexistent for all alternatives. Since 1957, the Navy has shipped over 660 containers of spent nuclear fuel from the shipyards and prototype sites to the Naval Reactors Facility. All of the shipments were made safely by rail and without release of radioactivity. Since any container alternative selected for use must meet the requirements of 10 CFR Part 71, Packaging and Transportation of Radioactive Material, and 10 CFR Part 72, Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Waste, used safely and reliably.

B.&C. The Navy understands that the different alternatives have different degrees of engineering and regulatory maturity. The Navy realizes that these differences may result in some uncertainty in cost and schedule for procurement of components of the container system. However, the Navy does not consider that these differences create a defacto environmental risk not evaluated in the EIS.

The criteria used to select the alternate container systems are listed in the EIS Chapter 3, Section 3.0. All the container systems are assumed to be able to meet the technical requirements in 10 CFR 71 and 10 CFR 72, and 10 CFR 60 when these are finalized. If a preferred container system cannot meet these technical requirements, it would not be used - and a container which does meet these requirements would be used instead. Thus, no additional environmental risk would arise.

With regard to schedule constraints, there appears to be sufficient time to allow design work and regulatory review to proceed on a normal pace. There also appears to be sufficient time to allow competitive bidding to identify the containers to be procured once the container system is selected. The agreement with the State of Idaho requires that the transfer of spent fuel from wet to dry storage shall commence by July 1, 2003 and that transfer to dry storage be completed by Calendar Year 2023. The agreement also requires that removal of spent fuel from Idaho be completed by Calendar Year 2035. These dates appear to be appropriate to select the container system to be used and to initiate design work and regulatory review.

D. A complete probabilistic risk assessment was not needed and was not performed for this EIS. The analyses for normal handling operations focused on the differences among the alternative container system concepts and how those might cause the impacts on human health and the environment to vary among alternatives. For the normal operations analyses presented in Appendix A, Section 2.4, the operations which resulted in a radiological release or direct radiation exposure were evaluated to estimate the resultant health effects. The radiological analyses results presented for normal facility operations take into account radiological releases or direct radiation exposure during spent nuclear fuel loading, storage, and unloading operations. For example, for loading operations, the alternative container systems fall into two categories, those that require repackaging prior to shipping and those that do not. The expected radiological releases resulting from repackaging operations are reflected in Table A.10. These results show larger risks for the No-Action and Current Technology/Rail Alternatives. Once the container lids are sealed, there are no radiological releases expected due to normal handling operations. The operations required to move a sealed container or cask into dry storage or prepare for shipment are expected to be very similar for all alternative container systems. Differences can also be seen in Table A.12, results for unloading operations at a repository, where the Multi-Purpose Canister Alternatives do not require repackaging into a disposal container. Hypothetical accident scenarios are covered in Section A.2.5.

Commenter: Edward M. Davis - NAC International, Georgia

E. The commenter claims that large container systems will occupy less area than small container systems and that the resultant lower probability of occurrence of hypothetical accidents (due to a smaller target size) will essentially cancel the higher expected consequences (due to the amount of fuel in the large container), such that the overall risk for all of the container system alternatives would be equal.

The area of the storage footprint does not necessarily increase with a greater number of smaller containers because the number of containers in a given area increases and the spacing between different types of container varies. The design of the storage container also affects the area required and varies from vendor to vendor for a given category of container. In addition, the probability of an airplane crash is not directly proportional to the area occupied by the storage containers. For example, a 10 percent decrease in the assumed storage area at the Idaho Chemical Processing Plant would decrease the airplane crash probability by approximately 5 percent. In contrast, the dose is directly proportional to the source term used for the container alternatives. To reduce the airplane crash probability by 50 percent the storage area would have to be reduced approximately 80 percent. Although detailed container system designs for naval spent nuclear fuel would be prepared by the eventual successful bidder, the differences in the actual size of the dry storage area for the alternative container systems are not expected to be large enough to change the conclusions of these analyses.

For the wind-driven missile and airplane crash hypothetical accident scenarios, the same probability of occurrence was used when calculating the risk for all container system alternatives. In addition, the source term was developed based on damage to only one container, regardless of the number of containers in the dry storage array or the size of the dry storage systems. Analysis of existing naval spent nuclear fuel transportation casks (M-130s and M-140s) has shown that they are strong enough to prevent penetration of the cask or damage to the spent fuel by a wind-driven missile or the largest parts from a large jet aircraft, even assuming a direct hit normal to the container surface. Of course, an object striking the container at an angle more oblique than 90 degrees would inflict even less damage. Despite these analysis results, damage to the container seal of a single container was assumed for both of these hypothetical accident scenarios. Similar analyses for the other container system alternatives could not be completed, since specific detailed designs have not been prepared for all container systems which might be used for naval spent nuclear fuel. Actual damage to these container systems during such hypothetical accidents may be greater or less than the damage to an M-140 cask; however, it is expected that any radiological releases would be similar because all dry storage container systems would be designed to the requirements of 10 CFR Part 72.

There are many factors which determine the actual consequences for a particular accident, many of which are container system design details such as structural integrity, size of the container, size of the storage system, and geometric shape of the storage system. In addition, the type of naval spent nuclear fuel (specific design of submarine or surface ship fuel) impacts the actual consequences of an accident. Other factors impact the actual probability of occurrence for these hypothetical accident scenarios, including target size (number, size, and spacing of the container systems in the dry storage array), size of the missile, energy of the missile, the angle of the hit, and the location of the hit on the dry storage system. Since all of these details are not known for all container system alternatives, an assumption was made that one container seal could be breached as a result of these accidents. This assumption results in consequences and risks which are not expected to be exceeded should an actual accident occur.

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As a result of this approach, the source terms, and thus the consequences, for these hypothetical accident scenarios are proportional to the amount of naval spent nuclear fuel that can be loaded into a single container system. For the wind-driven missile scenario, a corrosion product release, the source term was developed based on the surface area of the most limiting fuel type (by surface area) for each container alternative. The results in Tables A.22 through A.24 show annual risks at ICPP ranging from 7.0×10^{-9} to 1.2×10^{-8}, with the largest risk (High Capacity M-140, Transportable Storage Cask, and Dual-Purpose Canister) being 1.7 times larger than the smallest risk (Small Multi-Purpose Canister and M-140). For the airplane crash scenario, a corrosion product release plus a fission product release due to a subsequent fire, the source term was developed based on the fission products available for release in the most limiting fuel type (by fission product inventory) for each container alternative. The results in Table A.26 show annual risks ranging from 5.2×10^{-7} to 1.0×10^{-6}, with the largest risk (Large Multi-Purpose Canister) being 1.9 times larger than the smallest risk (Small Multi-Purpose Canister). These ranges in risk are very small when compared to the results of the uncertainty analysis which show that the risks presented in this EIS are believed to be 10 to 100 times larger than what would actually occur (see Section A.2.7). When taken in context with the conservatism applied in these analyses, the risks associated with all of the container alternatives are essentially similar; therefore, the analysis results of these hypothetical accidents do not distinguish among the alternatives. This conclusion is supported by the selection of a large container system, not one of the smaller containers, as the preferred alternative for dry storage and transportation of naval spent nuclear fuel (see Section 3.9).

F. Although the NAC-STC bore has the largest diameter, it also has the shortest length cavity. For the surface ship fuel, length is more restrictive in determining cargo capacities. The geometry results in fewer submarine fuel shipments but more surface ship fuel shipments; however, the net number of shipments is about the same as the large multi-purpose canister or the dual-purpose canister (325 shipments compared to 300 shipments). This small difference in the number of shipments produces only a small difference on the effect on the environment.

G. The Navy agrees with the commenter that any as-fabricated cask often produces dose rates which are lower than the regulatory limit. In the EIS Executive Summary, Sections S.6.1 and Chapter 3, Section 3.8 and Tables S.6 and 3.2 it is clearly stated that the actual historic doses have been used for the alternatives based on the M-140 and not for the other container systems. Section 3.8 of the EIS describes the Navy's preferred alternative which is not the M-140 containers. The best available data have been used in this EIS to estimate environmental impacts. Actual measurements are available for the M-140 container but none of the other containers have been used for naval fuel so the regulatory limit which serves as the design basis represents the best estimate of the external exposure rate for such containers. The use of actual measurements did not bias the selection of the preferred alternative.